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## THE NALLINE TEST III—OBJECTIONS, LIMITATIONS AND ASSESSMENT

STANLEY E. GRUPP

Stanley E. Grupp Ph.D. is Professor, Sociology Department, Illinois State University, Normal, Ill. This paper constitutes the third and final portion of his series on the Nalline Test. These articles were drawn from his unpublished doctoral dissertation, *The Nalline Test and Addict Attitudes*, (Indiana University 1967). In addition to his work and writings on these tests Professor Grupp has carried on research concerning marihuana and the emergent drug-use patterns.

The Nalline Test as a device used to control human behavior sometimes is a contributing factor in the deprivation of liberty. Therefore, in the effort to evaluate the test, it is absolutely essential that the observer be apprised of its limitations. Understanding is particularly important in this field because there is undoubtedly a tendency for some laymen to perceive the test as scientific, and therefore, infallible. In addition, use of the test as a control measure raises social and legal questions. In the latter regard the problems are somewhat similar to those posed by the drunkometer and the lie detector. With these factors in mind and by drawing on the literature and the experts in this field, consideration will be given to the more important objections and limitations of the Nalline Test and to a general assessment of it based on what available evidence there is. Some of the discussion which follows requires basic understanding of various aspects of the Nalline Test and its use. For this background the reader is referred to our earlier discussions.<sup>1</sup>

Although adopted in two of the three states with the biggest drug problem, California and Illinois, the Nalline Test has been subjected to criticism from a number of quarters. As we have previously discussed, it has not been accepted by some as a desirable narcotic control measure as evidenced by the several areas, some with an illicit drug-use problem, that have not chosen to adopt it.

The most articulate of various assessments of the Nalline Test has been based primarily upon evidence provided by medical and pharmacological research concerned with the sensitivity of the test. It is of special importance to recognize the questions raised regarding the sensitivity of the test and its limitations with reference to the specific drugs it

will detect and the conditions under which it will detect them.

### OBJECTIONS

A number of general objections have been voiced about the test most of which are of a judgmental nature. They are: (1) the view that the test is a punitive measure, (2) the use of congregate testing procedures and (3) the opinion that the use of the needle contributes to a "needle yen" or conjures up memories and stimulates the desire to take narcotics.

*Test as a Punitive Measure.* The Nalline Test has functioned as an arm of parole and probation supervision practices, and in this capacity has been used mainly as a means of maintaining tight controls over the user. One observer suggests the test has been "primarily used for punitive ends and sometimes it is a part of local programs designed to chase addicts into other communities."<sup>2</sup> Dr. Charles Hurley, an active supporter of the Nalline Test as a control measure, has observed, "Confessedly the test was designed to be and has been used as a club over the head of the addict whom no one should believe, or as a trap for the addict whom a few could believe."<sup>3</sup> Dr. Harris Isbell has stated, "The use of the nalorphine test in patients paroled or probated for addiction is a coercive measure, which is performed in the hope that it will reduce or delay relapse until the period of parole or probation is over. Since it is a coercive procedure, it is somewhat distasteful to physicians."<sup>4</sup>

With similar reasoning the late Dr. Kenneth W. Chapman, former Medical Director of the United

<sup>2</sup> LINDSMITH, *THE ADDICT AND THE LAW* 293 (1965).

<sup>3</sup> Hurley, *Anti-Narcotic Testing: A Physician's Point of View*, 27 *FEDERAL PROBATION* 34 (June, 1963).

<sup>4</sup> Isbell, *Thoughts on the Nalorphine Test for the Diagnosis of Addiction*, Unpublished paper presented at a meeting sponsored by the California Department of Public Health, Berkeley, California, January 8, 1958, 14.

<sup>1</sup> Grupp, *The Nalline Test I—Development and Implementation*, and *The Nalline Test II—Rationale*, 61 *THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY AND POLICE SCIENCE*, No. 2 & 3 (1970).

States Public Health Service Hospital at Lexington, opposed the involuntary use of the Nalline Test.

Nalline has certain possibilities to be used as . . . a chemical super ego. I am personally and unequivocally against using any drug to coerce anybody to do any thing, any time, anywhere. This is one of my personal and ethical convictions. If a person wishes to take the drug Nalline voluntarily and submits to the test on a voluntary basis, saying "I would like to do this so that I can help to keep myself straight," I would be perfectly willing to go along with it. I am just personally against (i) using drugs on an involuntary basis, and (ii) holding that this is the only condition on which an addict can be released into the community.<sup>5</sup>

*Congregate Testing Procedure.* Persons in the Nalline testing program are tested under congregated conditions. During most of the time at the testing station they are able to interact with other drug addicts in the program. Two of the inevitable results of this are the exchange of views regarding how to beat the test and how to obtain narcotics. Therefore, it appears that there are aspects of the testing procedure itself which enhance the possibility that a pro-drug-use pattern will be sustained. One critic has observed:

My sole objection to the Nalline testing program is the "clinic" nature of the program. . . . addicts themselves are thrown into too close an association as the result of their mutual presence in the clinics at the time the tests are conducted. . . . I have known addicts to say that it was at Nalline clinics that they made "contacts" for a later rendezvous with other addicts which eventually led to the purchase of narcotics.<sup>6</sup>

Lindesmith too has commented on the undesirability of programs that bring addicts together: "The clinic idea involves the danger of perpetuating the evils of congregated treatment by bringing

addicts together rather than keeping them separate."<sup>7</sup>

*Use of the Needle.* The fact that Nalline is administered by a needle has given rise to the observations that the test simulates the narcotic experience, that it may give sustenance to a "needle yen"<sup>8</sup> and that the Nalline shot gives a boost or stimulates the desire to take narcotics. An observer from an agency which considered the Nalline Test as a control measure but rejected it states:

. . . Nalline involves the use of a hypodermic which on the basis of common sense considerations alone, patently revives the memories leading to the rekindling of the desire for drugs. We have been informed by some addicts that they were frequently stimulated by the Nalline testing procedure to "shoot up" immediately after examination.<sup>9</sup>

Regarding the use of the hypodermic in the Nalline Test Chamlee observes:

Another aspect of this same problem is the situation wherein, . . . the addict becomes "addicted" to the needle. . . . I have known addicts who attached some special significance to the injection of any substance by means of hypodermic, and I have known one addict to claim (this is unconfirmed) that while he was able to refrain from the use of heroin during his period of parole, he was not able to refrain from the frequent use of other milder narcotics, which he invariably took by means of a needle, regardless of whether they could be administered orally or not. He secured some sort of emotional comfort simply from the use of the needle.<sup>10</sup>

Some claim that although it is not an addicting drug, Nalline itself simulates the narcotic experience and is, therefore, objectionable. Chamlee states that he knew of one addict

. . . who complained that the Nalline . . . gave him a "boost" which was very undesirable since it reminded him of the lift or "boost" that he got from taking narcotics. He, too, apparently genuinely desired to refrain from the use of narcotics, but re-

<sup>7</sup> THE ADDICT AND THE LAW, *op. cit.*, supra note 2 at 273.

<sup>8</sup> This term refers to the desire for and psychological satisfaction from having the needle prick the skin irrespective of the drug. Persons deriving such satisfactions are identified as "needle fiends" or "needle addicts."

<sup>9</sup> Letter from Dr. Alexander Bassin, Ph.D., Director, Research and Education, Probation Department, Second Judicial District, Supreme Court of the State of New York, Brooklyn, New York, May 17, 1965.

<sup>10</sup> Chamlee, *Letter to the Editor*, *op. cit.*, supra note 6 at 57-8.

<sup>5</sup> Comment by Dr. Kenneth W. Chapman in discussion of HARNEY's *The Requirement for Law Enforcement in NARCOTIC DRUG ADDICTION PROBLEMS*, Proceedings of the Symposium on the History of Narcotic Drug Addiction Problems March 27 and 28, 1958, Bethesda, Maryland, Department of Health, Education, and Welfare, Public Health Service Publication No. 1050 (Washington, D.C.: Government Printing Office), 97-98.

<sup>6</sup> Chamlee, United States Probation Officer, San Francisco, California, *Letter to the Editor*, 27 FEDERAL PROBATION 57-58 (September, 1963). For a biting rebuttal to this and other criticisms of Mr. Chamlee's point of view, see Brown, *Letter to the Editor*, in the same issue at 58.

marked that the Nalline Test served as a continual reminder to him of the pleasant effect which narcotics had upon him, and hence represented a continual temptation to return to the abuse of narcotics.<sup>11</sup>

*Assorted Objections.* Some negative assessments of the Nalline Test are highly subjective, impressionistic, and anecdotal in nature.<sup>12</sup> This kind of reaction is akin to some of the claims on the part of some of the Nalline Test's defenders who at times have resorted to similar emotionalized statements in their defenses of it.

Several more substantive objections present themselves which have not been given extensive comment in the literature. It is observed, for example, that specially trained physicians are required to administer the test and that such persons are not available. A New Jersey Drug Study Commission states, "It requires an expert to properly determine the validity of the test. This coupled with the scarcity of experts tends to defeat the usefulness of the nallorphine test."<sup>13</sup> Similar observations have been suggested by persons from several other areas that have considered using the Nalline Test.<sup>14</sup> In those jurisdictions utilizing the test the problem of obtaining physicians to administer it has in fact been a continuing one.

Still other objections have limited basis in fact, for example, the views regarding the unpleasant side effects of Nalline and that in heavily addicted persons, Nalline produces severe withdrawal symptoms. Although these statements themselves, given the proper circumstances, have some validity, they fail to consider the rarity of these occurrences and that in all Nalline testing situations the administering physician is equipped with a proper narcotic antidote. These factors reduce the force of this type of objection.

<sup>11</sup> *Ibid.*, at 57.

<sup>12</sup> In the opinion of the writer the Carey and Platt exposition falls in this category. See Carey and Platt, *The Nalline Clinic: Game or Superego?*, 2 ISSUES IN CRIMINOLOGY 223-244 (Fall, 1966). For a rejoinder see Grupp, *The Nalline Test: A Comment*, 3 ISSUES IN CRIMINOLOGY 87-89 (Summer, 1967).

<sup>13</sup> Narcotic Drug Study Commission, INTERIM REPORT 1964, New Jersey Legislature (March, 1965), 20-21.

<sup>14</sup> Letters from Dr. Alexander Bassin, Ph.D., Director, Research and Education, Probation Department, Second Judicial District, Supreme Court of the State of New York, Brooklyn, New York, May 15, 1965, and Mr. Paul J. Gernert, Chairman, Board of Parole, Commonwealth of Pennsylvania, August 28, 1964.

## LIMITATIONS

In addition to the general objections discussed above, several limitations of the Nalline Test should be recognized. These are (1) various medical and technical contraindications, (2) problems associated with pupil measurement and (3) the sensitivity of the test. Because of their importance the latter two will be discussed in some detail.

*Medical and Technical Contraindications.* The medical and technical contraindications of the Nalline Test have been succinctly discussed by Hurley.<sup>15</sup> Selected examples drawn from Dr. Hurley's discussion will be identified.

Medical contraindications include: repeated heart attacks, severe heart damage, advanced liver disease, last six weeks of a pregnancy, severe kidney disease, marked high blood pressure, glaucoma, and in some cases of epilepsy.

Technical contraindications as identified by Dr. Hurley include: marked fixed small pupils, widely fluctuant pupils, absence of sufficient contrast between the iris and the pupil, pupils under the effect of recent medication, and abnormal light reflex.

Many of the above contraindications are relatively rare and therefore present no real limitation to Nalline testing. Dr. Hurley states that he has never observed some of these conditions.

*Pupil Measurement.* The accuracy of the card pupillometer, which is commonly used in the measurement of the pupil in the implementation of the Nalline Test, has been seriously questioned.

It [card pupillometer] is an extremely simple method which gives very valuable information in circumstances where high accuracy is not required. However, studies at Lexington have shown that different observers will vary as much as two millimeters in their estimates of the size of the pupil and that the same observer, estimating sizes of pupils from photographs will vary as much as 1 millimeter in estimating the size of the pupil on the same photograph. Even with photographic method differences of as much as 1/2 millimeter on the same pupil between different observers or 1/2 millimeter by the same observer are not unusual.<sup>16</sup>

Negative assessment of the pupillometer then depends to an appreciable extent on the degree of accuracy required. Elliott and Way, in a study with nonaddicts, compared the pupil measurement

<sup>15</sup> *Anti-Narcotic Testing: A Physician's Point of View*, *op. cit.*, supra note 3 at 37.

<sup>16</sup> Letter from Dr. Harris Isbell, January 12, 1965.

results of two varieties of pupillometers (both a card pupillometer and a hole pupillometer) with an ophthalmologic slit lamp and a speed graphic camera, and concluded:

The simple pupillometers may be adequate in the hands of trained observers, since the usual decrease in pupil diameter amounts to 0.5 mm. or more, but more accurate measurements such as can be made from photographs should reduce the number of equivocal or no change reactions reported. The fact that in two instances an apparent human error of measurement occurred with the pupillometer and the slit lamp indicates that no single measurement of pupil size other than by photographic procedures should be conceded to be absolutely reliable, especially if the pupil test alone is used as legal evidence for indicating use of narcotics.<sup>17</sup>

Dr. Isbell observes, "The diagnoses of physical dependence . . . by means of Nalorphine should not be made on the basis of changes in pupillary size alone; rather it should be made on the basis of the total constellation of observable signs of abstinence precipitated by Nalorphine."<sup>18</sup> Persons who accept the usefulness of the Nalline Test are in general agreement on this point. Thorvald Brown, however, is of a somewhat different opinion:

Two or three withdrawal syndromes are not necessary to determine addiction, for out of several thousand tests, there has been no evidence that those found with a positive-type pupillary reaction were *not* using opiates. This fact, coupled with other evidence such as needle marks, possession of paraphernalia, admissions, and a history of usage is sufficient both legally and medically to sustain a diagnosis of opiate use.<sup>19</sup>

The thrust of these various observations, however, suggests that to the extent objections to the Nalline Test are based on limitations imposed by

the degree of accuracy of the interpretation of the pupillometer reading itself, these objections are diminished to the extent that the Nalline testing program uses other means of detection in addition to the pupillometer.<sup>20</sup> This correction factor, of course, also operates for those limiting aspects of the Nalline Test which emerge as the result of the test's effective range.

*Sensitivity of the Test.* The question of sensitivity is a crucial one, cutting into many aspects of the test as a narcotic control measure. The question as conceived here asks, assuming the pupil is measured with maximum accuracy, to what extent is the Nalline Test an accurate means for identifying the presence of narcotics in the system? Several questions emerge from this basic question: What are the limitations with regard to the narcotics the Nalline Test will detect? With respect to the narcotics it will detect are there any limitations to the test's ability to detect the presence of these narcotics?

Nalline will not detect marihuana, amphetamines, cocaine, or barbiturates. Nalline's effectiveness as a narcotic detection measure is limited to the opiates; however, there are several limitations within this category. The limitations relate to the test's sensitivity with regard to meperidine (demerol) and codeine.

Unless the individual has developed a high tolerance level, the Nalline Test will not detect the presence of meperidine or codeine. "Meperidine addiction . . . must be extremely advanced before unequivocal results can be expected."<sup>21</sup> Dr. Isbell states that, "A positive reaction in meperidine addicts is usually only obtained if the addict is taking more than 1,600 mg. per day."<sup>22</sup> An earlier estimate placed the intake of meperidine at 2,000 mg. or more daily before showing a positive Nalline Test.<sup>23</sup>

A similar situation presents itself with codeine. In 1961 a California procedural manual for narcotic use testing commented that the withdrawal as pre-

<sup>17</sup> Elliott and Way, with the technical assistance of Fields, *Effect of Narcotic Antagonists on the Pupil Diameter of Nonaddicts*, 2 CLINICAL PHARMACOLOGY AND THERAPEUTICS 721 (November-December, 1961). This article is reprinted in slightly modified form in Mosk, Attorney General and Director, Department of Justice, California, REPORTS ON COMPARATIVE STUDIES ON THE DETECTION OF NARCOTIC USERS WITH CHEMICAL TESTS AND EFFECT OF NARCOTIC ANTAGONISTS ON THE PUPIL DIAMETER OF NONADDICTS (Sacramento: California State Printing Office, 1961), 11-21.

<sup>18</sup> Letter from Dr. Harris Isbell, January 12, 1965.

<sup>19</sup> Brown, *Three Years of Nalline*, Paper presented at Joint Meeting of the Northern-Central California Narcotics Officers Association with Southern California Narcotics Officers, Palm Springs, California, October 29-30, 1959 (mimeograph), 10.

<sup>20</sup> For an interesting discussion of the views and practices of several doctors regarding the interpretation of pupil readings see, CONFERENCE ON THE USE OF NALLINE IN NARCOTIC CONTROL, Department of Justice, State of California, Fresno, California, April 1-2, 1960, 35-37 and 40-42.

<sup>21</sup> Comment by Dr. Henry Elliott, *ibid.*, at 24.

<sup>22</sup> *Thoughts on the Nalorphine Test for the Diagnosis of Addiction*, *op. cit.*, supra note 4 at 4.

<sup>23</sup> *Rapid Diagnosis of Addiction to Morphine*, 154 Editorials and Comments, JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 414 (January 30, 1954).

cipitated by Nalline and Lofan, is "much less marked if the patient is addicted to codeine or meperidine (Demerol)."<sup>24</sup> Although in the same year, 1961, Thorvald Brown observed that the Nalline Test will detect codeine, more recently a number of observers have agreed that the test has definite limitations in this regard. Elliott *et al* have stated "that the nalorphine test is not a reliable indicator of codeine unless intake is continuous over a period of more than five days."<sup>25</sup>

Complete information on the sensitivity of the Nalline Test is not available and in fact may not be possible; however, in recent years there have been a series of studies designed to provide more adequate information regarding the accuracy of the test. Aside from the non-opiates which the Nalline Test does not detect, it appears that the test is the least sensitive to meperidine and codeine. Irrespective, Nalline has certain limitations in the detection of the remainder of the opiates and it is to a consideration of some of these limitations that we now turn.

The question regarding the sensitivity of the test may be restated: To what extent does the Nalline Test produce false-positive results and to what extent does it produce false-negative results?<sup>26</sup> Or, stated differently, what is the effective range of the Nalline Test in its ability to detect narcotics in the system?

The nature of positive and negative tests needs to be clarified. It will be recalled that a positive test is an ostensible indication of the presence of drugs in the system while an opposite indication is true for a negative test. It is noted, however, that a positive or negative test is a function of the sensitivity of the test and is, therefore, a relative phenomenon. This is equally as true for chemical tests as it is for the Nalline Test. Nomof and Fischer have observed, "The Nalline Test depends on a physiologic reaction. At best, such a test can never hope to achieve 100 per cent precision."<sup>27</sup> Dr. E. L.

<sup>24</sup> California Department of Public Health in Conjunction with the Bureau of Narcotic Enforcement, Department of Justice, RECOMMENDED PROCEDURE FOR NARCOTIC USE TESTING OF PROBATIONERS AND PAROLEES 9 (1961).

<sup>25</sup> Elliott, Nomof, Parker, Dewey and Way, *Comparison of the Nalorphine Test and Urinary Analysis in the Detection of Narcotic Use*, 5 CLINICAL PHARMACOLOGY AND THERAPEUTICS 412 (July-August, 1964).

<sup>26</sup> False-positive results are positive Nalline Tests found to be negative by chemical test procedures while false-negative results are negative Nalline Tests found to be positive by chemical test procedures.

<sup>27</sup> Nomof, M.D., and Fischer, M.D., *Control of Narcotic Addiction: A Medical-Legal Approach—A Report to Sheriff John Gibbons*, 15 (Release by Sheriff John

Way has stated:

*Theoretically, there is no such thing as a negative test or a positive test because a test is defined by the limits of the sensitivity of the method. With some methods, you will not find anything at 10 micrograms per milliliter; this would be a negative test. However, a more sensitive method would give a positive test. With a better method, you might detect 1 microgram and, ultimately, even a hundredth of a microgram. Hence, a negative test for morphine does not necessarily mean that no morphine is present; it merely means that no morphine was found by the method used for the analysis.*

By the same token, a positive test is also relative. There is not one single positive test for morphine or for heroin that is absolute. If you do two tests for morphine, you are a little more sure; if you do three or four, then you are just all the more sure. So, if we do three or four good, reliable tests, using methods that have a relatively high degree of specificity for morphine, that is usually sufficient.<sup>28</sup>

With regard to the opiates that the Nalline Test is designed to detect, just how sensitive is it? To answer this question the typical procedure is to compare Nalline Test results with one or more of the several chemical tests, that is, urinalysis. *This is done because it is commonly accepted that urinalysis is more sensitive than the Nalline Test and with full acceptance of the fact that no one test be it biological or chemical is 100 per cent correct.*<sup>29</sup>

Compared to urinalysis just how accurate is the Nalline Test? This is not easily answered. The most exhaustive of the early studies in the order of their appearance in published form are two reports in 1961 issued under the auspices of the California Department of Justice,<sup>30</sup> a study by Coyle C.

Gibbons, Santa Clara County, San Jose, California, n.d.).

<sup>28</sup> Comment by Way, CONFERENCE ON THE USE OF NALLINE IN NARCOTIC CONTROL, *op. cit.*, supra note 20 at 25. Emphasis added. See pages 25-29 for Way's entire comment.

<sup>29</sup> One of the limitations of urinalysis itself is suggested by an observation of Dr. Guy R. Turgeon, Medical Consultant on Narcotic Control for the Parole and Community Services Division of the California Department of Corrections, Los Angeles, California. Dr. Turgeon states, "Many of our positive tests in which the urine was negative have been corroborated by other evidence of use." Letter from Dr. Turgeon, July 15, 1965.

<sup>30</sup> *Comparative Studies on the Detection of Narcotic Users With Chemical and Pupillary Tests* published in REPORTS ON COMPARATIVE STUDIES ON THE DETECTION OF NARCOTIC USERS WITH CHEMICAL TESTS AND EFFECT OF NARCOTIC ANTAGONISTS ON THE PUPIL DIAMETER OF NONADDICTS, *op. cit.*, supra note 17 at 7-10. Revision published under different title, Way,

Mason and Herndon G. Shepherd published in 1962,<sup>21</sup> and in 1964 a study by Henry W. Elliott, *et al.*<sup>22</sup>

Of the above studies, three have given special attention to the simultaneous checking of the Nalline Test with one or more chemical tests (urinalysis). In all instances the chemical tests are based on an analysis of urine samples taken at the time the Nalline Test was administered. Data representing selected results of these comparisons are presented in Tables 1, 2, and 3. It should again be emphasized that the findings reflect the extent of agreement between two different, biological and chemical, testing procedures neither of which is correct all of the time.

Table 1 indicates considerable agreement between the two testing procedures in both the Elliott study and the Way study, seventy-five per cent and eighty-four per cent of the comparisons agreed respectively. The reasons for the lower percentage agreement in the Mason study, approximately fifty-nine per cent, is unknown. However, the relatively higher per cent of equivocal (questionable) Nalline Tests in the Mason study, as indicated in Table 3, and the fact that the Mason study found no equivocal tests by the chemical procedure (not presented in the tables) may be an important factor. Again, the reasons for this higher proportion of equivocal Nalline Tests are unknown, but the more important factors are probably the criteria used for negative and positive tests and the interpretation of the reading by the examiner.<sup>23</sup>

The data in Table 1 suggests that using urinalysis as a criterion the Nalline Test is "wrong" from a low of sixteen per cent of the comparisons in the Way study, in approximately twenty-five per cent

Elliott and Nomof, with the technical assistance of Fields, *Comparison of Chemical Tests With the Pupillary Method for the Diagnosis of Narcotic Use*, 15 BULLETIN ON NARCOTICS 29-33 (January-March, 1963); and MOSK, Attorney General and Director, Department of Justice, California, A REPORT ON THE SYNTHETIC OPIATE ANTI-NARCOTIC TESTING PROGRAM, Pursuant to Statutes 1959, Chapter 2129, 11-12 (1961). The investigators of the last study are identified as Elliott and Way.

<sup>21</sup> Mason and Shepherd, *Evaluation of Two Screening Procedures for Detecting the Use of Opiates*, 37 THE AMERICAN JOURNAL OF CLINICAL PATHOLOGY 176-181 (1962).

<sup>22</sup> *Comparison of the Nalorphine Test and Urinary Analysis in the Detection of Narcotic Use*, *op. cit.*, supra note 25.

<sup>23</sup> Innumerable factors could be involved here, including the type of drug taken, if any, by the subject, the quality of the drug taken and the length of time since the drug had been consumed. See discussion below regarding Table 2.

TABLE 1

AGREEMENT OF NALLINE TEST AND CHEMICAL TEST\*

Study	Total Tests Compared	Positive by Both Procedures	Negative by Both Procedures	Results Different	Percentage Agreement of Both Procedures
Elliott	183	13	124	46	74.9
Mason	154	34	57	63	59.1
Way	419	13	339	67	84.0
	756	60	520	176	77.0

\* Source: ELLIOTT, reported in A REPORT ON THE SYNTHETIC OPIATE ANTI-NARCOTIC TESTING PROGRAM, see footnote 30; Mason, *Evaluation of Two Screening Procedures for Detecting the Use of Opiates*, see footnote 31; Way, *Comparison of Chemical Tests with the Pupillary Method for the Diagnosis of Narcotic Use*, see footnote 30.

TABLE 2

NALLINE TESTS FOUND FALSE-POSITIVE AND FALSE-NEGATIVE AS DETERMINED BY CHEMICAL TESTS\*

Study	Total Tests Compared	Tests Found False-Positive	Per Cent of Tests Found False-Positive	Tests Found False-Negative	Per Cent of Tests Found False-Negative
Elliott	183	5	2.7	12	6.6
Mason	154	15	9.7	4	2.6
Way	419	12	2.9	18	4.3
	756	32	4.2	34	4.5

\* Source: See Table 1.

TABLE 3

EQUIVOCAL NALLINE TESTS FOUND POSITIVE AND NEGATIVE BY CHEMICAL TESTS\*

Study	Total Tests Compared	Equivocal Tests by Nalline	Number of Equivocal Nalline Tests Found Positive	Per Cent of Total Found Positive	Number of Equivocal Nalline Tests Found Negative	Per Cent of Total Found Negative
Elliott	183	17	9	4.9	8	4.4
Mason	154	44	26	16.9	18	11.7
Way	419	21	10	2.4	11	2.6
	756	82	45	6.0	37	4.9

\* Source: See Table 1.

of the comparisons in the Elliott study to a high of approximately forty-one per cent of the comparisons in the Mason study.

False-positive and false-negative Nalline Tests

are of special interest because these results give a reasonably firm indication of the extent the test is most decisively "wrong." Inspection of the false-negative results in Table 2 indicates that relatively few persons using drugs would remain unidentified. No more than six and six-tenths per cent would go unidentified in the Elliott study, while a lower per cent, four and three-tenths per cent, would go undetected in the Way study and only two and six-tenths per cent of the surreptitious drug users would escape identification were the results of the Mason study to prevail.

As identified by the Nalline Test some subjects would be falsely accused of having drugs in their system. Inspection of the false-positive test results in Table 2 indicates that as many as nine and seven-tenths per cent of the subjects would be falsely accused of having narcotics in their systems were the findings of the Mason study to prevail while in the Elliott and the Way study persons falsely accused reach a low of two and seven-tenths per cent and two and nine-tenths per cent respectively.

Equivocal Nalline Tests as presented in Table 3 are tests for which there is a suspicion of use but not sufficient pupil dilation to give the examiner cause to call the reading positive and not sufficient pupil contraction to warrant a negative pupil reading appraisal. It is noted that in both the Elliott and Way studies the percentage of equivocal Nalline Tests found positive and negative is rather well balanced, varying no more than one-half of one per cent. Over five per cent more equivocal tests were found positive than negative in the Mason study. While innumerable factors may be involved here the probable explanation is the criteria used for determining positive and negative tests as well as the interpretation by the examiner. The decision of how to record a no-change pupillary response is an example.<sup>34</sup>

At the risk of redundancy, it must be unrelentingly emphasized that the above comparative estimates using urinalysis-chemical testing as a criterion, represent a strategy in the effort to evaluate the sensitiveness of the Nalline Test and to develop improved anti-narcotic testing procedures. A considerable amount of research relevant to the Nalline Test has been this form of technical investigation, using urinalysis-chemical testing as a criterion.

Given the criterion utilized and the assumption that one of our goals is the identification of surreptitious users of narcotics, the data from the studies

represented in Tables 1, 2, and 3 do not raise serious questions about the sensitivity of the test since relatively few persons (false-negative tests) would go undetected and for those who are equivocal, testing and supervision procedures can be initiated to enable more careful checking on the individual in the future.

As early as 1964, a time relationship and controlled dose study of Henry W. Elliott, Norman Nomof, and others, raised serious concern regarding the sensitivity of the Nalline Test and therefore of its effectiveness as an identifier of surreptitious users of narcotics.<sup>35</sup> Pertinent findings include the recognition that the Nalline Test, as determined by controlled administration of narcotics and in contrast to chemical identification procedures, yields an increasing proportion of negative test readings as the time increases since the last dose. A number of studies have since concurred with this finding.

Comparison of Nalline Test results with those of chemical analysis of the urine following the administration of 15 mg. of morphine are summarized by Elliott *et al* as follows:

If it is assumed that an equivocal pupil reaction is indicative of morphine use, the pupil test reaches maximum reliability at 2 to 4 hours.<sup>36</sup> After 4 hours the pupillary reaction reverts rapidly to negative. By contrast, urinalysis provided an accurate indication of the presence of morphine in the urine for as long as 36 hours after the injection. . . . At 12 hours all urine tests were positive, including 22 in which the nalorphine test was negative or equivocal. Even at 18 and 36 hours, 80 and 85 per cent of the chemical tests were positive. At these times the nalorphine test was positive in less than 10 per cent of the subjects. In no subject was a negative chemical test recorded in the presence of a positive nalorphine test.<sup>37</sup>

<sup>35</sup> Comparison of the Nalorphine Test and Urinary Analysis in the Detection of Narcotic Use, *op. cit.*, supra note 25.

<sup>36</sup> Earlier observations have conflicted on the question of whether or not the Nalline Test is capable of detecting individuals after single doses of a narcotic. Isbell has stated that "Positive reactions could not be obtained after single doses of morphine in nontolerant patients even when as much as 90 mg. of morphine was given in single dose." But he found that, "positive reactions are observed after 10-15 mg. of nalorphine in patients who have taken 15 mg. of morphine four times daily for three days, 10 mg. of methadone four times daily for two days, or 15 mg. of heroin four times daily for two days. See, *Thoughts on the Nalorphine Test for the Diagnosis of Addiction*, *op. cit.*, supra note 4 at 4. In 1960 Elliott observed that "nalorphine will reverse miosis due to a single dose of morphine. . . ." See, CONFERENCE ON THE USE OF NALLINE IN NARCOTIC CONTROL, *op. cit.*, supra note 20 at 25.

<sup>37</sup> Comparison of the Nalorphine Test and Urinary Analysis in the Detection of Narcotic Use, *op. cit.*, supra note 25 at 413. Emphasis added.

<sup>34</sup> See note 20.



Reporting on the reaction of Nalline following sustained administration of morphine, Elliott *et al* state:

... we gave a group of subjects 15 mg. of morphine... every 6 hours for 5 days, testing every 24 hours following the seventh dose and for 2 days after the last dose. ... Mydriasis increased slightly each day until the drug was stopped. One negative test was recorded on each of the first and fourth days of testing. As expected, the nalorphine test proved to be a reasonably reliable indication of morphine intake. Consistent with the known rapid elimination of morphine, subjects gave negative tests 20 hours after the last dose of morphine, and all but 5 were negative 44 hours later. It should be noted that the nalorphine test may remain positive in some subjects for at least 24 hours following chronic morphine administration.<sup>38</sup>

The suggestion is that the Nalline Test is more effective in identifying the presence of narcotics after sustained use than after a single dose. With special reference to the question of time, and the relationship of various loading doses to the results of the Nalline Test, Dr. Norman Nomof has observed:

We have given multiple doses of Morphine on several occasions, usually only two or three doses consecutively but in one experiment, repeated doses over a period of five days. In each case, the Nalline test returned to negative at a time when the urine test still tested positive for Morphine. ... It is true, however, that the Nalline test remains positive for a longer time following the last dose of Morphine after five days of administration than it does after a single test dose. We have not conducted a test in which we have attempted to addict subjects to high doses of Morphine or Heroin, but I assume the Nalorphine test would remain positive for periods of 48 hours or longer if the loading doses were sufficient. In our five day Morphine experiment the Nalorphine test was largely negative at the end of 24 hours, although several subjects had persistently positive tests 36 hours following the last dose of Morphine. This is in contrast to the experience with single doses of Morphine where Nalline is usually negative within 12 hours whereas a urine chemical test will remain positive for 24 hours.<sup>39</sup>

It is clear that as contrasted to the chemical tests the Nalline Test has definite limitations. Put in simple terms, the longer the time after the last narcotic intake the greater the chance that the

pupil reading will be negative. This fact makes it possible for the narcotic user to prepare for the test by refraining from drug use during the period immediately preceding the time of the test, thus increasing his chances that he will be found negative.

Several recent studies are particularly worthy of note. Using field data from 160 positive Nalline Tests and 844 equivocal tests for which urine was submitted for chemical analysis, Parker, Hine *et al* report that 48.6 per cent of the positive tests and 20.5 per cent of the equivocal tests were confirmed by urinalysis.<sup>40</sup> This is in marked contrast to earlier findings by some of these same researchers.<sup>41</sup> The authors attribute the discrepancy in part to differences in sampling procedures. "In the initial study urines were taken without regards to the results of the pupil test... in the present study urines were obtained from selected subjects with positive and equivocal tests. ..." <sup>42</sup> It is of interest, however, that in an independent comment on this finding it is reported that "half the subjects who reacted positively to the pupil test, and whose urine did not contain the drug, either admitted to heroin use within the previous 48 hours or had fresh needle marks." <sup>43</sup> In a subsequent and similar study using 88 positive Nalline Tests and 987 equivocal tests several of the same researchers report that only 47, fifty-three per cent of the positive pupil tests and 145, fifteen per cent of the equivocal tests were confirmed by chemical tests.<sup>44</sup> In sum, using chemical testing as a criterion, these studies indicate a relatively high proportion of false-positive Nalline Tests.

Way, Mo *et al*, however, report a very favorable situation with respect to agreement between the Nalline Test and urinalysis-chemical testing procedures. This research was conducted in Hong Kong with 79 long-term addicts who had been admitted for treatment, allowed to continue with their usual mode of narcotic administration and dosage and subsequently withdrawn under obser-

<sup>40</sup> Parker, Hine, Nomof, Elliott, *Urine Screening Techniques Employed in the Detection of Users of Narcotics and Their Correlation with the Nalorphine Test*, 11 *Journal of Forensic Sciences* 152-168 (April, 1966).

<sup>41</sup> For the earlier study see, *Comparison of Chemical Tests With the Pupillary Method for the Diagnosis of Narcotic Use*, *op. cit.*, supra note 30 and the discussion above relevant to Tables 1, 2 and 3.

<sup>42</sup> *Urine Screening Techniques Employed in the Detection of Users of Narcotics and Their Correlation with the Nalorphine Test*, *op. cit.*, supra note 40 at 162.

<sup>43</sup> Elliott, Nomof, Parker, Turgeon, *Detection of Narcotic Use: Comparison of the Nalorphine (Pupil) Test With Chemical Tests*, 109 *CALIF. MEDICINE*, 124 (Aug. 1968).

<sup>44</sup> *Ibid.*

<sup>38</sup> *Ibid.*, 411.

<sup>39</sup> Letter from Dr. Norman Nomof, December 7, 1964.

vation. On the first day of withdrawal there was agreement between the Nalline Test and urinalysis in ninety-five per cent of the cases.<sup>45</sup>

The findings of Parker, Hine *et al* and Elliott, Nomof *et al* are in noticeable disagreement with the earlier studies reported above. As Parker, Hine *et al* have observed, differences in sampling procedures probably account for some of the difference. Also, the fact that the base criterion, urinalysis, was ostensibly wrong (as measured by needle marks and addict's own admission) in about half of the cases where positive pupil tests were found to be negative by chemical procedures, raises serious question about the chemical testing procedures themselves. In commenting on the discrepancies reported in their studies, Elliott, Nomof *et al* question whether either the Nalline Test or chemical tests are as reliable under field conditions as they are in controlled situations.<sup>46</sup> Unfortunately, it is only in a controlled situation that it is possible to know exactly what narcotics have been used and how much has been used. Way, Mo *et al* also found a decrease in agreement of the Nalline Test and chemical testing procedures on the second and third day of withdrawal and comment specifically on the general problem of evaluating the sensitivity of the Nalline Test and of making comparisons with chemical testing procedures. They state:

Since each test was positive in a significant number of cases when the other was negative, it is apparent that in this gray zone, the two tests complement each other. Each test has advantages and disadvantages over the other.

A comparison of the two tests, the pupil and the chemical tests, is of interest but cannot be completely valid since the pupil test is assessing an almost immediate drug response, whereas the chemical test is estimating levels of free drug and biotransformation product in urine for considerable periods beyond the reaction time. Since different parameters are involved, a perfect temporal correlation cannot be expected.<sup>47</sup>

<sup>45</sup> Way, Mo, Quock in collaboration with Yap, Ou, Chan, Chera, *Evaluation of the Nalorphine Pupil Diagnostic Test for Narcotic Usage in Long-Term Heroin and Opium Addicts*, 7 CLINICAL PHARMACOLOGY & THERAPEUTICS, 300 (May-June, 1966). This study is of special interest in that it involved a variety of opiate addicts, intravenous and intramuscular, heroin users who used the "dragon chasing" and "ack ack" methods as well as addicts who smoked opium and those who consumed it orally. The sample maintained themselves at high dosage levels typically not found in the West.

<sup>46</sup> *Detection of Narcotic Use: Comparison of the Nalorphine (Pupil) Test With Chemical Tests*, *op. cit.*, supra note 43 at 125.

<sup>47</sup> *Evaluation of the Nalorphine Pupil Diagnostic Test*

Innumerable factors are involved in the failure of the Nalline Test results and chemical test results to correspond, some of which have been mentioned above. These factors include:

1. Spontaneous change in pupil size between readings;
2. Error in the measurement of the pupil;
3. Stringency of interpretation regarding pupil variation;
4. Time lapse since the last use of narcotics;
5. The kind of habit and drug used;
6. Length of time between pupil measurements;
7. Environmental factors affecting changes in pupillary diameter;
8. Variation in subjects pupillary response to Nalline;
9. Fixing just before or after the injection of Nalline;
10. Use of mydriatic or miotic substances which interfere with the Nalline Test, for example, amphetamines which dilate the pupil and eserine eyedrops which have the opposite effect;
11. If "strongly addicted to heroin or morphine but recently withdrawn . . . the pupillary test may still be responsive. . . ." <sup>48</sup>
12. Errors in obtaining urine sample;
13. Chemical test error.

Several of these various factors suggest ways in which the Nalline Test might be "beaten." It should be emphasized, however, that the possibility of "beating" the test rests to a great extent on the perspicaciousness of the examining physician with particular reference to his knowledgeableness about (1) the problems inherent in the limitations of the Nalline Test, (2) the effects of drugs on the system and (3) the reaction to Nalline of the person being tested.

Our discussion of the sensitivity of the Nalline Test has indicated certain limitations of this test. Some studies also indicate that chemical testing procedures also have their limitations. No test, biological or chemical, is one hundred per cent correct.

#### TEST AS A SCREENING DEVICE

Recognition of the limitations of the Nalline Test, particularly its sensitivity, has resulted in the

*for Narcotic Usage in Long-Term Heroin and Opium Addicts*, *op. cit.*, supra note 45 at 309.

<sup>48</sup> *Comparison of Chemical Tests with the Pupillary Method for the Diagnosis of Narcotic Use*, *op. cit.*, supra note 30 at 31.

recommendation that the test be used only as a screening device and as one of several aids for the diagnosis of the presence of narcotics in the system. Response to this point of view has varied from no action to the requirement that all positive and equivocal Nalline Tests or persons suspected of using drugs by other criteria, be checked by one or more chemical procedures and for other signs of narcotic usage.

The view that the Nalline Test should be used as a screen has long been recognized. In Illinois it was recognized in the report of the Narcotics, Dangerous Drug, and Hazardous Substance Investigation Commission and by the research of Mason and Shepherd.<sup>49</sup> Observations from California have consistently recommended that the test be used as a screening measure and diagnostic supplement. Terry and Teixeira observed, for example, in 1962, "The limitations of the nalorphine test as it is being used in California should be more generally recognized. Too much emphasis is placed on the pupillary measurement with no additional evidence of narcotic use. The test should be considered only as an aid in the diagnosis and nothing more."<sup>50</sup> Formal reports in California have clearly emphasized that the Nalline Test should not be the single criteria of narcotic use. "The pupil test with nalorphine is a useful test for determining whether an individual has taken narcotic agents but change in pupil size alone is insufficient evidence to establish this for certainty."<sup>51</sup> Other California reports have taken the same position.<sup>52</sup>

As a screening device, the Nalline Test meets the need for a rapid screening measure. Dr. Norman Nomof, intimately acquainted with the test both as a researcher and in its administration has observed, "Despite the obvious limitations of Nalorphine it is my general feeling that it still serves

as a reasonably adequate screening test since it probably will give a correct answer 95 per cent of the time or better under unselected field conditions."<sup>53</sup> A number of specialists in the field of anti-narcotic testing have emphasized the merits of the Nalline Test as a rapid screening agent and strongly support its use in this manner.<sup>54</sup>

Increased knowledge about the sensitivity of the Nalline Test appears to have been one of the factors contributing to policy changes in the use of Nalline in California discussed above. Effective June 1, 1964 the California Department of Corrections adopted the policy of corroborating all positive and questionable Nalline Tests with a chemical test.<sup>55</sup> Since this time several California agencies in addition to the Department of Corrections have modified their use of the Nalline Test by incorporating urinalysis into the program.

#### ASSESSMENT

Major research efforts involving the Nalline Test have been primarily in the form of technical studies as discussed above, which address the question of the test's sensitivity. It can be reasoned, however, that regardless of the test's technical efficacy it may be achieving or can potentially achieve some of its objectives. With the exception of these technical studies, however, there is a conspicuous absence of research that investigates the question. Unfortunately there has been only limited longitudinal investigation and studies with a sociological or socio-psychological perspective are similarly limited. The general findings from three independent investigations dealing with various aspects of the Nalline Test will now be discussed.

In an early study of the criminal offenses of seventy-one Nalline program participants, both before the Nalline program had been established and after their participation in the program, it was concluded that the Nalline Test does have a

<sup>49</sup> Narcotics, Dangerous Drug and Hazardous Substance Investigating Commission, A REPORT IN THE INTEREST OF THE HEALTH AND SAFETY OF THE PEOPLE OF THE STATE OF ILLINOIS (Third Report), Report to the 72nd General Assembly—May 31, 1961 (Springfield: Illinois, 1961), 32-34 and 51 and *Evaluation of Two Screening Procedures for Detecting the Use of Opiates*, *op. cit.*, supra note 31 at 178 and 180.

<sup>50</sup> Terry and Teixeira, *Nalorphine Testing for Illegal Narcotic Use in California: Methods and Limitations*, 2 THE JOURNAL OF NEW DRUGS 208 (July-August, 1962).

<sup>51</sup> REPORTS ON COMPARATIVE STUDIES ON THE DETECTION OF NARCOTIC USERS WITH CHEMICAL TESTS AND EFFECT OF NARCOTIC ANTAGONISTS ON THE PUPIL DIAMETER OF NONADDICTS, *op. cit.*, supra note 17 at 10.

<sup>52</sup> See, for example, A REPORT ON THE SYNTHETIC OPIATE ANTI-NARCOTIC TESTING PROGRAM, *op. cit.*, supra note 30 at 11-12, and RECOMMENDED PROCEDURE FOR NARCOTIC USE TESTING OF PROBATIONERS AND PAROLEES, *op. cit.*, supra note 24 at 2.

<sup>53</sup> Letter from Dr. Norman Nomof, December 7, 1964.

<sup>54</sup> See, for example, *Detection of Narcotic Use: Comparison of the Nalorphine (Pupil) Test With Chemical Tests*, *op. cit.*, supra note 43 at 125 and *Evaluation of the Nalorphine Pupil Diagnostic Test for Narcotic Usage in Long-Term Heroin and Opium Addicts*, *op. cit.*, supra note 45 at 309-310.

<sup>55</sup> Dr. Nomof attributes this policy change to the findings of the study by Elliott, Nomof *et al.* Letter from Dr. Norman Nomof, December 7, 1964. For the citation on this study see *op. cit.*, supra note 25. See also the discussion regarding the implementation of the Nalline Test in California in Grupp, *The Nalline Test I—Development and Implementation*, *op. cit.*, supra note 1.

deterrent effect with respect to criminal involvement in "addictive-type offenses."<sup>56</sup> Unfortunately this study did not consider the influence of age, type of addiction, differential handling, or the possibility that other variables may have been involved in the decreases in "addictive-type offenses" that were established. To the best of this writer's knowledge no other investigators have since used this strategy for investigating the effects of the Nalline Test. This is an area that might profitably be pursued.

Using successful completion of probation as a criterion, Bailey found some differences in readmission rates and in the post-probation criminal involvement of twenty-five randomly selected former addict-probationers, eighteen of whom were probation failures and seven who were successes. As measured by readmission rates (failure to pass four consecutive Nalline Tests) probation successes were less apt to become readmitted. On the other hand the successes had a higher mean rate of test failures during the probation period. Analysis of his data leads Bailey to conclude, "Apparently nalline testing does help some addict-probationers (1) to postpone readmission, and (2) when readmission occurs, to handle the experience in a more constructive way than usual."<sup>57</sup> The smallness of the sample and the fact that the study was not designed as an evaluation of the Nalline testing program suggest a need for restraint in the interpretation of this generalization.

Under the assumption that the views of addicts in the Nalline testing program offer a useful means to assemble information about the Nalline program and to assist in the evaluation of the test, data was collected by this writer from 216 addicts involved in the Nalline program in Chicago, Illinois and Oakland, California. The study assumed that in any program whose objective is to control addicts, the opinions of the addicts themselves should be considered and are as valid as the views of authorities who implement the control mechanism. As reflected in the experiences of these addicts, their participation in the Nalline program was not the sustained type of experience envisaged by some of the test's defenders. In general, the addicts' opinions differed from those

expected if there were any appreciable agreement with the rationale which sustains the test. Addicts tend to disagree with the claim that the test fosters addict mobility, that it reduces the supply of hard drugs in the area, and that it causes users to experiment with other drugs. Marked differences in opinions of addicts from the two areas sampled were established in several instances with respect to both their views about the effects of the test and their general attitude toward the Nalline Test. Since operation of the Nalline testing program at that time was quite different in Chicago and Oakland, these findings suggest that differences in the implementation of the control mechanism does have a variable effect on persons in the program. On the other hand the data do not provide any substantial support for the Nalline Test as it is presently operated either as a rehabilitative or deterrent agent. A number of variables were found to be positively associated with attitude toward the Nalline Test, and it is felt that this warrants further exploration as a means of improving the effectiveness of the test and control measures of this kind. The exploratory nature of the study requires that these conclusions be considered speculative.<sup>58</sup>

Any evaluation of the Nalline Test as a narcotic control vehicle should, of course, recognize the potential injustice to individuals which can result from false-negative tests. Such injustices are lessened by the use of additional detection measures as recommended by most authorities. The use of the Nalline Test as a rapid screening device is now the common pattern and undoubtedly the most desirable one. In this regard, however, it should again be stressed that chemical testing procedures also have their definite limitations and that no one test is infallible.

It is unfortunate that we have not had more investigation designed to assess the contribution of the Nalline Test and its potential. There is a need to specify the conditions under which the Nalline Test is most efficacious and to determine what type of person is most apt to profit from participation in the Nalline testing program. Stated another way, there is a need for a control-

<sup>56</sup> Smith, *Nalline Examinations of Narcotic Addicts: Analysis of Deterrent Effects*, Unpublished Master of Criminology thesis, School of Criminology, University of California, 1960.

<sup>57</sup> Bailey, *Nalline Control of Addict-Probationers*, 3 THE INTERNATIONAL JOURNAL OF THE ADDICTIONS 137 (1968).

<sup>58</sup> See Grupp, *The Nalline Test and Addict Attitudes*, Unpublished doctoral dissertation, Indiana University, 1967; *The Nalline Test as Reflected in the Attitudes and Experiences of Subjects in the Nalline Testing Program*, MINUTES OF THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, 1966, National Research Council, National Academy of Sciences and *Addict Mobility and the Nalline Test* 63 THE BRITISH JOURNAL OF ADDICTION (1968).

treatment typology of addicts. The development of this typology needs to consider the range of drug-use patterns and the full complement of control-treatment modalities including casework, compulsory supervision, community based programs, group therapies, methadone and cyclazocine procedures, controlled dosage programs as well as anti-narcotic testing procedures. The development of control-treatment typologies has been a neglected area, in part because of ignorance of the drug problem as a whole, and only modest progress has been made in this direction. In the reports related to this general problem, the emphasis tends to be on the range of control-treatment modalities that are available,<sup>59</sup> and not on the integration or recasting of these modalities with addicts' psychological and social characteristics, patterns of drug-use, the cultural setting, and the stage of the drug-use career in view.<sup>60</sup> The one notable exception to this pattern in the literature is the work of Brotman, Freedman, and Meyer.<sup>61</sup>

Results of the innumerable research investiga-

tions discussed in this paper are not always consistent with each other and do not permit firm conclusions regarding the efficacy of the Nalline Test. Short of further studies here in the United States of the type conducted by Way and his associates, which duplicate or closely approximate the addict's usual dosage level and of adequately controlled, full-scale field investigations including longitudinal studies, the choice to use the Nalline Test will have to proceed with less certainty about its effects than might otherwise be necessary. On the other hand it must be admitted that research may not necessarily be able to answer all questions concerning the Nalline Test.

While the thought of trying to control human beings by jabbing needles into them may be repugnant to some, the possibility that the Nalline Test may in fact be capable of achieving some of its objectives cannot be denied. If so, the empirical question to be investigated is *for whom, to what extent, and under what circumstances* is the Nalline Test most effective? The potential of the test needs to be investigated and established by responsible controlled research studies. Until such research is conducted the decision to use the test will have to proceed largely on the basis of faith. On the other hand it can be reasoned that the Nalline Test does make logical sense if we assume that the use of drugs can be controlled through the application of the deterrent principle. Widely applied, when integrated into the anti-narcotic testing program as a rapid screening device and as a prelude (when indicated by positive tests) to chemical anti-narcotic testing, the complex of testing procedures appears to fulfill the long recognized prerequisites of the deterrent theory of punishment, namely certainty of apprehension.

<sup>59</sup> See, for example, Freedman, Brotman and Meyer, *A Model Continuum for a Community-Based Program for the Prevention and Treatment of Narcotic Addiction*, 54 AMERICAN JOURNAL OF PUBLIC HEALTH 791-802 (May, 1964); Brill, *Three Treatment Modalities in the Casework Treatment of Narcotic Addicts*, paper presented at the National Association of Social Workers Institute, October 26, 1966; and Rubington, *Two Types of Drug Use*, 3 THE INTERNATIONAL JOURNAL OF THE ADDICTIONS 301-318 (Fall, 1968).

<sup>60</sup> For discussion of the kind of typology envisaged here see, Gibbons and Garrity, *Some Suggestions for the Development of Etiological Treatment Theory in Criminology*, 38 SOCIAL FORCES (October, 1959); and GIBBONS, *CHANGING THE LAWBREAKER* (1965).

<sup>61</sup> See Brotman, Freedman and Meyer, *CONTINUITIES AND DISCONTINUITIES IN THE PROCESS OF PATIENT CARE FOR NARCOTIC ADDICTS*, Final Report to the Health Research Council, New York, New York, April, 1965.